Listing of Claims:

58. (canceled)

59. (previously presented) A method of nucleating the growth of a diamond film, wherein the film is nucleated with at least one higher diamondoid.

60. (original) The method of claim 59, wherein the higher diamondoid is selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, and undecamantane.

61. (previously presented) A method of nucleating the growth of a diamond film, the method comprising the steps of:

a) providing a reactor having an enclosed process space;

b) positioning a substrate within the process space;

c) introducing a process gas into the process space;

d) coupling energy into the process space from an energy source; and

e) injecting at least one higher diamondoid into the process space, wherein the at least one higher diamondoid nucleates the growth of the diamond film on the substrate.

62. (previously presented) The method of claim 61, wherein the reactor is configured to carry out a chemical vapor deposition (CVD) technique.

63. (previously presented) The method of claim 62, wherein the chemical vapor deposition technique is a plasma enhanced chemical vapor deposition (PECVD) technique.

64. (canceled)

65. (canceled)

66. (previously presented) The method of claim 61, wherein the at least one higher diamondoid is a substituted higher diamondoid.

67. (previously presented) The method of claim 61, wherein the nucleation is independent of the nature of the substrate.

68. (previously presented) The method of claim 61, wherein the substrate is a carbide forming substrate.

69. (previously presented) The method of claim 68, wherein the substrate is selected from the group consisting of Si and Mo.

70. (previously presented) The method of claim 61, wherein the substrate is a non-carbide forming substrate.

71. (previously presented) The method of claim 70, wherein the substrate is selected from the group consisting of Ni and Pt.

72. (previously presented) The method of claim 61, wherein the process gas comprises methane and hydrogen.

73. (previously presented) The method of claim 72, wherein the process gas further includes an inert gas.

74. (previously presented) The method of claim 73, wherein the inert gas is argon.

75. (previously presented) The method of claim 61, wherein the energy source comprises an induction coil such that the power coupled into the process space generates a plasma.

76. (previously presented) The method of claim 72, further including the step of converting the hydrogen within the process space to monoatomic hydrogen.

77. (previously presented) The method of claim 61, wherein the injecting step comprises volatilizing the at least one higher diamondoid by heating such that it sublimes into the gas phase.

78. (previously presented) The method of claim 77, wherein the injecting step includes entrainment of the sublimed higher diamondoid in a carrier gas which is introduced into the process chamber.

79. (previously presented) The method of claim 78, wherein the carrier gas is at least one gas selected from the group consisting of hydrogen, nitrogen, an inert gas, and a carbon precursor gas.

80. (previously presented) The method of claim 79, wherein the inert gas is a noble gas, and wherein the carbon precursor gas is at least one gas selected from the group consisting of methane, ethane, and ethylene.

81. (previously presented) The method of claim 61, wherein the nucleation rate of the ~~diamondoid~~ diamond film ranges from about 10^4 to 10^{10} cm^{-2} s^{-1}.

82. (previously presented) The method of claim 61, wherein the injecting step allows carbon atoms to be deposited on the substrate 10 or more atoms at a time.

83. (previously presented) The method of claim 61, wherein the injecting of the at least one higher diamondoid increases the growth rate of the diamond film by a factor of at least two to three times.

84. (previously presented) The method of claim 61, wherein the injecting of the at least one higher diamondoid increases the growth rate of the diamond film by at least an order of magnitude.

85. (previously presented) The method of claim 61, wherein the injecting of the at least one higher diamondoid occurs at the beginning of a deposition process.

86. (previously presented) The method of claim 61, wherein the injecting of the at least one higher diamondoid occurs during at least part of the growth of the diamond film.

87. (previously presented) The method of claim 61, further including the step of selecting a particular higher diamondoid to facilitate the growth of a diamond film having a desired crystalline orientation.

88. (previously presented) The method of claim 61, wherein the substrate is rotated during at least a part of the growth of the diamond film.

89. (canceled)

90. (previously presented) A diamond film nucleated by at least one higher diamondoid.

91. (previously presented) A diamond film nucleated by the steps comprising:

a) providing a reactor having an enclosed process space;

b) positioning a substrate within the process space;

c) introducing a process gas into the process space;

d) coupling energy into the process space from an energy source; and

e) injecting at least one higher diamondoid into the process space, wherein the at least one higher diamondoid nucleates the growth of the diamond film on the substrate.

92. (previously presented) The diamond film of claim 90, wherein the diamond film is an ultrananocrystalline film.

93. (previously presented) The diamond film of claim 92, wherein the ultrananocrystalline film has a microstructure comprising a three to five nanometer crystallite size.

94. (previously presented) The diamond film of claim 90, wherein the higher diamondoid is selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, and undecamantane.

95. (previously presented) The diamond film of claim 91, wherein the higher diamondoid is selected from the group consisting of tetramantane, pentamantane, hexamantane, heptamantane, octamantane, nonamantane, decamantane, and undecamantane.